

*Myrmeciza atrothorax*, *Hylophylax poecilinota*, *Pithys albifrons*, *Formicarius colma*, *Chamaeza campanisona*, *Myrmothera simplex*, *Elaenia ruficeps*, *Elaenia pallatangae*, *Mecocerculus leucophrys*, *Mionectes macconnelli*, *Phylloscartes nigrifrons*, *Pogonotriccus chapmani*, *Zimmerius gracilipes*, *Hemitriccus margaritaceiventer*, *Platyrinchus coronatus*, *Onychorhynchus coronatus*, *Myiophobus roraimae*, *Hirundinea ferruginea*, *Contopus fumigatus*, *Knipolegus poecilurus*, *Attila spadiceus*+, *Rhytipterna simplex*, *Myiarchus swainsoni*, *Tyrannus melancholicus*, *Schiffornis turdinus*, *Procnias alba*#, *Rupicola rupicola*, *Pipra cornuta*, *Pipra erythrocephala*, *Lepidothrix coronota*, *Lepidothrix suavisissima*, *Hylophilus sclateri*, *Hirundo rustica*\*, *Thryothorus coraya*, *Henicorhina leucosticta*, *Microcerculus ustulatus*, *Catharus minimus*, *Platycichla flavipes*, *Platycichla leucops*, *Turdus ignobilis*, *Setophaga ruticilla*, *Seiurus noveboracensis*, *Myioborus cardonai*, *Basileuterus bivittatus*, *Tachyphonus surinamus*, *Tachyphonus phoenicius*, *Piranga flava*, *Thraupis palmarum*, *Euphonia xanthogaster*, *Chlorophonia cyanea*, *Tangara guttata*, *Tangara gyrola*, *Tangara cayana*\*, *Tangara velia*, *Chlorophanes spiza*, *Cyanerpes caeruleus*, *Cyanerpes cyaneus*, *Coereba flaveola*, *Atlapetes personatus*, *Zonotrichia capensis*, *Pitylus grossus*, *Icterus chryscephalus*, *Psarocolius viridis*\*.

N.B. *Chaetura cinereiventris*, *Dysithamnus mentalis* and *Notiochelidon cyanoleuca* are considered part of the Guaiquinima tepui montane avifauna by Willard *et al.* (1991), yet there appear to be neither specimens nor sight records of the latter two to support their inclusion, whilst the former has only been recorded from Salto Guaiquinima at an altitude of 300 m. Although their presence on Guaiquinima would not be unlikely, we prefer not to include them here. Similarly, Ridgely & Tudor (1989) mention the presence of *Myioborus miniatus* on Cerro Guaiquinima (discussing similar species to *Myioborus cardonai*), but there are no records of this species for this tepui.

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## **A new extinct species of snipe *Coenocorypha* from Vitilevu, Fiji.**

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The Fijian archipelago (320 islands, 18,270 km<sup>2</sup>) has the largest area of land in the Central Pacific (Pernetta & Watling 1979). It would have been considerably larger when sea level was more than 100 m lower during Pleistocene glaciations and Vitilevu was linked with Vanualevu (Watling 1982, Gibbons 1985). Vitilevu is the oldest island in the archipelago, with rocks of the Yavuna Group of late Eocene to early Oligocene age (Rodda 1994). While there may have been land associated with these older rocks, emergent land was certainly present during the deposition of the Wainimala Group (late Oligocene-middle Miocene) and probably has been present continuously since about 16 million years ago (Chase 1971, Rodda 1994). Fiji therefore has a terrestrial biota older than any other Pacific oceanic landmass except New Zealand or New Caledonia and so may be expected to have a well-developed endemic faunal component.

The modern vertebrate fauna of Fiji is characterised by the absence of terrestrial mammals, as in other Pacific islands. Birds dominate the extant fauna but there is also a diverse herpetofauna of frogs (2 spp), iguanas (2 spp), geckos (10 spp; 4 presumed to be introduced by people prehistorically), skinks (12 spp), and snakes (2

spp) (Pernetta & Watling 1979, Watling & Zug 1998). Indigenous mammals are restricted to six species of bats (Flannery 1995). This Fijian fauna with its endemic frogs (*Platymanthis* spp.), iguanas (*Brachylophus vitiensis*, *B. fasciatus*), and a snake (*Ogmodon vitianus*) has few equivalents on typical oceanic islands. The granitic Seychelles islands, with endemic snakes, lizards and amphibians but no terrestrial mammals (Stoddart 1984), are however similar to Fiji in this respect.

Throughout the Pacific, the fossil record of birds has revealed many extinct species and range reductions of others. In New Zealand, 39 species became extinct on the main North and South islands (Turbott 1990, Worthy 1999), but there are 66 extinct taxa known from the whole New Zealand archipelago (Worthy & Holdaway in press). Gigantism and flightlessness, as shown in New Zealand by the 11 species of moa (Dinornithiformes), large rail-like birds (Aptornithidae: *Aptornis*, two species), and waterfowl (Anatidae: *Cnemiornis*, two species), are common evolutionary trends on mammalian predator-free islands (Worthy & Holdaway 2002). The Hawaiian archipelago lost more than half its bird diversity (James & Olson 1991, Olson & James 1991), including at least four species of large, flightless, browsing anatids, called moa-nalos. Elsewhere in the Pacific, often up to half the species in the fossil record were found to be extinct, as in the Marquesas (Steadman 1989a, Steadman & Rolett 1996), Easter Island (Steadman 1995), Henderson Island (Wragg & Weisler 1994), Society Islands (Steadman 1989a), Samoa (Steadman 1994), and on the Tongan and Cook Island groups (Steadman 1989a, 1993, 1995). Amongst the extinct taxa are many species of rails, megapodes, columbids and parrots (Balouet & Olson 1987, Steadman 1987, 1989b, 1992, Steadman & Zarriello 1987). A similar history of avifaunal extinction has also been found in the western Pacific in New Caledonia (Balouet & Olson 1989) and there are indications of them in Micronesia (Steadman & Intoh 1994).

A total of 69 indigenous land bird species are known historically from the Fijian archipelago (Watling 1982). Vitilevu, which is the largest island, has the greatest diversity with 47 land birds. Some 56% of these land birds are endemic (Watling 1982), yet few described species are unusual or aberrant, which is unusual in avifaunas from older islands. It is even more unusual for an oceanic island to apparently have so few historical extinctions, there being only two, the Barred-wing Rail *Nesoclopeus poecilopterus*, globally extinct, and the Wandering Whistling-duck *Dendrocygna arcuata* whose population was extirpated in the late nineteenth century (Watling 1982).

Unlike the rich archaeological and palaeontological records from New Zealand and many other places in the Pacific, there are few indications of the prehistoric fauna from Fiji. An extinct *Ducula* and a megapode were recorded from an archaeological site on Lakeba (Lau Group) (Gibbons 1985, Balouet & Olson 1987, Steadman 1989b) and a megapode was reported from Naigani Island off the eastern coast of Vitilevu (Best 1981, van Tets 1985: 198). Both archaeological faunas were deposited by Lapita people at about 2,900-2,600 CAL yrs BP and therefore date to the earliest colonisation of Fiji by people (Anderson & Clark 1999).

The first fossil deposits in Vitilevu were revealed in 1999 (Worthy *et al.* 1999). They provided a spectacular assemblage of extinct species, including a terrestrial

crocodilian (n. gen. et. sp.), a tortoise, a giant iguana (n. gen. et. sp.), and a giant frog (*Platymantis megabotoniviti*) (Worthy 2001a, Worthy *et al.* 1999, Molnar *et al.* in press, Pregill & Worthy 2003). The fossil avifauna was no less spectacular, with gigantism taking its own unique course in Fiji to produce huge pigeons and megapodes. Apart from an extinct endemic scrubfowl (*Megapodius amissus*) there was a giant megapode *Megavitiornis altirostris* that rivalled the New Caledonian *Sylviornis* in size (Worthy 2000). More unexpected, there was an equally giant flightless pigeon and a very large volant species of *Ducula* (Worthy 2001b). The new giant pigeon is the first such, flightless, pigeon reported from the Pacific and was of similar size to the Dodo *Raphus cucullatus*. Other extinct birds include a large rail with a long, probing, ibis-like bill, a small teal *Anas* sp., and a snipe. The last is the subject of this paper. Fossil material collected by the author has been deposited in the collections of the Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand.

## Study site

The discovery of the fossils described herein is a result of the Indo-Pacific Colonisation Project at the Department of Archaeology and Natural History, Australian National University, Canberra (coordinated by A. J. Anderson), investigating the human colonisation of Fiji and its environmental consequences. As part of this project, I searched caves for fossil vertebrate remains, aided by the Fiji Museum (Worthy & Anderson 1999).

Despite fossil faunas being recovered from several localities, fossil snipe bones were found in only a single cave site, Vatuma Cave, c. 12 km south of Nadi (Map Reference: L28/647020, edition 1, 1992; 17° 52' 57"S, 177° 28' 29" E) in Vitilevu. The fossils were in clay sediments accumulated around boulders at the base of a 10 m deep shaft inside the large cave entrance. The faunal composition and the fragmented nature of the remains suggest the assemblage was accumulated by an avian predator, possibly the Peregrine *Falco peregrinus* (Worthy *et al.*, in press). This assemblage was inferred to pre-date human occupation of the area as there was no midden debris (mollusc shells, pottery, or charcoal) in the sediment matrix containing the fossils, despite its abundance in sediments elsewhere around the site. Also, this was the only avian predator-accumulated assemblage of prehuman age located during the project, the other sites being all of pitfall origin.

## Methods

### Abbreviations

#### Institutions

AIM, Auckland Institute and Museum, Auckland, New Zealand (NZ); CM, Canterbury Museum, Christchurch, NZ; MNZ, Museum of New Zealand Te Papa Tongarewa, Wellington (formerly National Museum of New Zealand, Dominion Museum, and Colonial Museum), NZ; WO, Museum of Caves, Waitomo Caves, NZ.

### Anatomical nomenclature

The terms for specific bone landmarks follow Baumel & Witmer (1993). The common term *processus* is abbreviated as *proc.* throughout. When listing material, bones are identified as left (L) or right (R) elements. L or R prefixed by 'p' or 'd' indicates 'proximal' and 'distal' part of the element respectively, e.g., pR fem means the proximal part of a right femur.

### Measurements

Measurements were made with TESA® dial callipers and rounded to 0.1 mm. TL: greatest length. PW: proximal width in the lateromedial plane. SW: shaft width at mid-length in a lateromedial plane. SD: shaft width in a dorsoventral plane. DW: distal width.

### Comparative material

In the south-west Pacific, *Coenocorypha* is the only sedentary genus of snipe (Gallinaginae) - though several species of *Gallinago* and the Asiatic dowitcher *Limnodromus* are transequatorial migrants into the region. I follow the higher taxonomy of Higgins & Davies (1996) with the modification that Gallinaginae is the correct spelling for the subfamily based on *Gallinago* (*Gallinago* is a feminine form of *Gallus*, so the nominative singular ending in '-go' becomes the genitive singular '-gin-' to form the stem for family group names, thus '-gininae'; Steven Gregory pers. comm, 21 October 2001), and note that *Limnodromus* is often included in Gallinaginae, e.g., by Piersma (1996). I follow the nomenclature for *Coenocorypha* taxa advocated by Holdaway *et al.* (2001) and Worthy *et al.* (in press). All material is from modern skeletons unless stated otherwise. Extinct taxa are indicated †.

*Coenocorypha a. aucklandica* (G. R. Gray, 1845) Auckland Island Snipe: MNZ 562-S, MNZ 18340, MNZ 19780, MNZ 23115a, MNZ 26380a, CM Av5539.

*Coenocorypha a. meinertzhagenae* Rothschild, 1927, Antipodes Island Snipe: MNZ 15130, MNZ 25660, CM Av5190.

*Coenocorypha huegeli* (Tristram, 1893), Snares Island Snipe: MNZ 24434, MNZ 24435 (mix of two individuals), MNZ 25166, MNZ 25692, MNZ 26429, CM Av5200.

*Coenocorypha pusilla* (Buller, 1869), Chatham Island Snipe: MNZ 1406, MNZ 16667/1, MNZ 18329, MNZ 23514, MNZ 23572, MNZ 23694, MNZ 23871a, MNZ 23869a, MNZ 24228, MNZ 24260, MNZ 26388, MNZ 23870a, MNZ 26389, MNZ 26390, MNZ 26457, AIM B2086, CM Av6574.

†*Coenocorypha iredalei* Rothschild, 1921, Stewart Island Snipe: Skeletal - Native Island: MNZ S35438, MNZ S35941; Ruapuke Island: CM Av25331. The following South Island specimens referred to this taxon by Worthy *et al.* (in press) also were examined: Cobden Quarry, Greymouth, MNZ S38743-38754, 558 bones from 38 individuals; Honeycomb Hill Cave System, Oparara, northwest Nelson CM Av36393, MNZ S22661, MNZ S25671, MNZ S25746; and Moonsilver Cave, northwest Nelson MNZ S26799.

†*Coenocorypha barrierensis* Oliver 1955, North Island Snipe: Lake Poukawa MNZ13191, 17628, 21789, 21787, 21788; Flc Cave, Waitomo Caves WO63; St Benedicts Caverns, Waitomo Caves WO78; Cutthroat Cave, Waitomo Caves WO395; Coincidence Cavern, Waitomo Caves WO76.

*Gallinago gallinago* (Linnaeus, 1758), Common Snipe, MNZ 24315a, Hongkong; MNZ 22158, United States of America.

*Limnodromus semipalmatus* (Blyth, 1848), Asiatic Dowitcher, MNZ 25662, Hongkong.

*Scolopax rusticola* (Linnaeus, 1758), Eurasian Woodcock, MNZ 1255, France.

In addition to the above, species were examined in the MNZ from a wide range of other charadriiform genera as follows: *Haematopus*, *Himantopus*, *Glareola*, *Burhinus*, *Charadrius*, *Thinornis*, *Anarhynchus*, *Pluvialis*, *Vanellus*, *Arenaria*, *Calidris*, *Philomachus*, *Numenius*, *Limosa*, *Tringa*, *Phalaropus*, *Larus*, and *Sterna*.

### Systematic palaeontology

#### **Order Charadriiformes, Family Scolopacidae, Subfamily Gallinaginae, Genus *Coenocorypha* G. R. Gray**

The fossils of the new taxon described herein are typically charadriiform and referred to the Scolopacidae as they have the following combination of characters: humerus with a straight shaft rather than appearing sigmoid in anterior view or 'C-shaped' in caudal view; the caudal surface of the *crista deltopectoralis* is convex, not concave; and the *incisura capitis* is interrupted by a low transverse ridge, as noted by Zusi & Jehl (1970). In addition, the humerus has a well developed dorsal *fossa pneumotricipitalis* that is about half the diameter of the non-pneumatic ventral *fossa pneumotricipitalis*; the *margo caudalis* (capital shaft ridge) is weakly developed, rather than strongly compressed dorso-ventrally and markedly raised above the caudal surface; the caudal surface between the *tuberculum dorsale* and the *margo caudalis* is flat, not deeply grooved; the *impressio coracobrachialis* is very weakly developed; the *crista deltopectoralis* is recurved ventrally over the *facies bicipitalis*; and it has well-developed *proc. supracondylaris dorsalis*.

They are referred to *Coenocorypha* by the following combination of characters: premaxilla is elongate with the rostrum (where the premaxilla overlies the fused *os nasales*) inflated slightly laterally and markedly ventrally distally of well-developed impressions of the nasal choanae on the ventral surface. On the humerus, the distance between the tip of the *proc. supracondylaris dorsalis* and the distal extreme of the *condylus dorsalis* is less than the width across the *condylus ventralis* and *condylus dorsalis*; the area between the *condylus dorsalis* and the *proc. supracondylaris dorsalis* is concave as the latter process is oriented somewhat cranially rather than dorsally; the ridge bordering the *fossa m. brachialis* ventrally is narrow and concave above the *tuberculum supracondylare ventrale*; the ventral facies proximal to the *epicondylus ventralis* lacks a deep elongate fossa so that the ridge proximal to the *tuberculum supracondylare ventrale* is convex ventrally opposite the *fossa m.*

*brachialis*. The *crista deltopectoralis* is more strongly recurved ventrally over *facies bicipitalis* than in other genera and the *tuberculum dorsale* is not prominent.

### ***Coenocorypha miratropica* sp. nov.**

#### **Holotype**

A complete left humerus, part of MNZ S38711. Vatuma Cave, c. 12 km south of Nadi, Vitilevu, Fiji; 17° 52' 57" S 177° 28' 29" E; T. H. Worthy, G. Udy, S. Matararaba, 18 November 1999. Geologic age unknown, but probably Holocene.

#### **Diagnosis**

A *Coenocorypha* species larger than all congeners (Tables 1, 2) with the *tuberculum supracondylare ventrale* relatively larger and uniquely extending proximal of *condylus dorsalis*.

#### **Description of holotype**

The holotype humerus (Fig. 1) is not mineralised and is creamy white in colour. It is complete except for slight erosion to the proximal end of the *condylus dorsalis*.

The *fossa m. brachialis* is more rounded and does not extend as far proximally past the *proc. supracondylaris dorsalis* as it does in the New Zealand *Coenocorypha* taxa. This, together with the relatively larger *tuberculum supracondylare ventrale*, results in a much less elongate *fossa m. brachialis*. The proximal half of the *facies caudalis* of the mid shaft region has a 7 mm long ridge on it ending about 4 mm from the *tuberculum dorsale*. The *tuberculum dorsale* is slightly elevated distally.

#### **Measurements of the holotype (mm)**

Length 40.2; proximal width 10.4; mid-shaft width 3.0; mid-shaft depth 2.6; distal width 7.3; height from *proc. supracondylaris dorsalis* to the *condylus dorsalis* 5.4; width across the *condylus ventralis* and *condylus dorsalis* 5.7.

TABLE 1.

Measurements (mm) for *Coenocorypha miratropica* from MNZ S38711.

Under element, L is left, R is right and 'd' is distal.

| Element                 | Length | Proximal width | Shaft width | Shaft depth | Distal width |
|-------------------------|--------|----------------|-------------|-------------|--------------|
| Humerus <i>Holotype</i> | 40.2   | 10.4           | 3.0         | 2.6         | 7.3          |
| Humerus (dR)            |        |                |             |             | 7.5          |
| Humerus (dL)            |        |                | 3.1         | 2.7         | 7.6          |
| Humerus (dR)            |        |                | 3.2         | 2.6         |              |
| Ulna (dR)               |        |                |             |             | 4.7          |
| Ulna (dR)               |        |                |             |             | 4.6          |
| Carpometacarpus (L)     | 26.8   | 6.7            |             |             |              |
| Carpometacarpus (L)     | 26.3   | 6.5            |             |             |              |
| Carpometacarpus (L)     | 26.0   | 6.5            |             |             |              |

### Paratypes

Other elements in MNZ S38711 are designated paratypes as follows: 1dL2dR humeri, 2dR ulnae, 3L carpometacarpi, 1L scapula, 1dR1pR tarsometatarsus, 1 pL radius, 2 caudal sections of premaxillary rostrum. Measurements are given in Table 1. The paratype humeri differ from the holotype only by being slightly larger.

### Etymology

The species is named from the adjectival forms *mirabilis* and *tropicus* for the surprising fact that this predominantly high latitude genus should occur on a tropical island.

### Comparison with other species

#### Humerus

All other *Coenocorypha* species are smaller than *C. miratropica* (Table 2). In other *Coenocorypha* taxa the ridge on the proximal half of the *facies caudalis* is weak or absent and the *tuberculum dorsale* is not elevated. These two differences may relate to the increased size of the Fijian bird.

Other close relatives of *Coenocorypha* differ as follows. The humerus of *Limnodromus* has the *tuberculum dorsale* distinctly elevated; the *margo caudalis* is strongly compressed; the *crista deltopectoralis* does not recurve over the *facies bicipitalis*; the *impressio coracobrachialis*, while small, is distinct; the distance between the tip of the *proc. supracondylaris dorsalis* and the distal extreme of the *condylus dorsalis* is markedly more than the width across the *condylus dorsalis* and the *condylus ventralis* (as in *Gallinago*); and the *facies ventralis*, above the *epicondylus ventralis*, has a deep elongate fossa undercutting the ridge bounding the *fossa m. brachialis* (also as in *Gallinago*).

In addition to the features noted above, the humerus of *Gallinago* differs further from that of *Coenocorypha* in that



Figure 1. Humeri of *Coenocorypha* in caudal (upper) and cranial (lower) views. A, left humerus *Coenocorypha miratropica* MNZ S38711; B, left humerus *C. a. aucklandica* MNZ 26380a; C, right humerus *C. huegeli* MNZ 25692.

TABLE 2.

Measurements for New Zealand *Coenocorypha* taxa, both modern and extinct from Worthy *et al.* (in press). L length, P proximal width, S shaft width, D distal width. Data are mean  $\pm$  1 standard error (range) n. The data for '*Coenocorypha iredalei* Cobden fossil site' are for the largest sample available from a single locality. With negligible temporal variation and no geographic variation, this sample provides the best indication of population variation in this genus. The data for fossil '*C. iredalei* (other fossils)' are from all fossil sites in the South Island other than Cobden. The data for '*C. barrierensis* fossil' are for fossil bones from various sites in North Island.

| Species  | Hum L                               | Hum P                            | Hum S                            | Hum D                            |
|--|-------------------------------------|----------------------------------|----------------------------------|----------------------------------|
| <i>Coenocorypha a. aucklandica</i>                 | 34.4 $\pm$ 0.26<br>(33.6-35.4) 6    | 8.2 $\pm$ 0.13<br>(7.8-8.6) 6    | 2.3 $\pm$ 0.04<br>(2.1-2.4) 6    | 5.8 $\pm$ 0.05<br>(5.5-6.2) 6    |
| <i>Coenocorypha a. meinertzhagenae</i>             | 34.0 $\pm$ 0.30<br>(33.7-34.3) 2    | 7.9 $\pm$ 0.10<br>(7.8-8.0) 2    | 2.3 $\pm$ 0.10<br>(2.2-2.4) 2    | 5.8 $\pm$ 0.05<br>(5.7-5.8) 2    |
| <i>Coenocorypha huegeli</i>                        | 34.2 $\pm$ 0.24<br>(33.4-35.2) 6    | 8.3 $\pm$ 0.11<br>(8.0-8.7) 6    | 2.4 $\pm$ 0.04<br>(2.2-2.5) 6    | 6.1 $\pm$ 0.04<br>(5.9-6.2) 6    |
| <i>Coenocorypha pusilla</i>                        | 31.56 $\pm$ 0.168<br>(30.6-32.6) 13 | 7.58 $\pm$ 0.035<br>(7.4-7.8) 11 | 2.43 $\pm$ 0.024<br>(2.3-2.6) 13 | 5.46 $\pm$ 0.043<br>(5.1-5.7) 12 |
| <i>Coenocorypha iredalei</i><br>Cobden fossil site | 34.85 $\pm$ 0.168<br>(32.9-36.7) 30 | 8.33 $\pm$ 0.055<br>(7.8-8.9) 27 | 2.46 $\pm$ 0.018<br>(2.3-2.7) 30 | 5.84 $\pm$ 0.038<br>(5.5-6.6) 30 |
| <i>Coenocorypha iredalei</i><br>(other fossils)    | 34.94 $\pm$ 0.198<br>(32.9-37.3) 42 | 8.32 $\pm$ 0.057<br>(7.5-8.9) 34 | 2.48 $\pm$ 0.021<br>(2.2-2.7) 42 | 5.9 $\pm$ 0.04<br>(5.2-6.3) 34   |
| <i>Coenocorypha barrierensis</i> fossil            | 33.70 $\pm$ 0.242<br>(32.4-35.7) 19 | 8.05 $\pm$ 0.094<br>(7.4-8.8) 17 | 2.38 $\pm$ 0.03<br>(2.0-2.6) 24  | 5.71 $\pm$ 0.057<br>(5.2-6.1) 19 |

the *proc. supracondylaris dorsalis* is more dorsally oriented so that the area between it and the *condylus dorsalis* is flat (vs concave).

#### *Ulna and Radius*

The two paratypic distal ulnae and one proximal radius are unremarkable in form.

#### *Carpometacarpus*

The three fossil paratype left carpometacarpi are typical of *Coenocorypha* with a proximally directed *proc. extensorius*, a robust *proc. pisiformis*, and the ventral side of the *os metacarpale minus* joins proximally to the *os metacarpale alulare* as a ridge that extends to the base of the *proc. pisiformis*. In contrast, *Gallinago* has a relatively larger and more proximally directed *proc. extensorius* and a much reduced *proc. pisiformis* and the ridge leading from the *os metacarpale minus* extends proximally to a point midway between the *proc. pisiformis* and the internal rim of the *trochlea carpalis*.

#### *Scapula*

The paratype proximal left scapula is an enlarged version of that of other *Coenocorypha* with a width of 5.8 mm across the articular end.



### Tarsometatarsus

The hypotarsal region of the paratype proximal tarsometatarsus is eroded so the canal structure is not comparable to modern specimens. The shaft is robust, unlike the elongate slender tarsometatarsus of *Gallinago* or *Limnodromus*, and has lateral and medial ridges on its posterior facies. The lateral ridge becomes less pronounced distally prior to the break and, judging by the equivalent structure in other *Coenocorypha* species, about half of the bone is missing, indicating a reconstructed total length of *c.* 36 mm. The *tuberositas m. tibialis cranialis* is a paired structure in snipe with the medial one largest. In the fossil, neither is prominent and both are in the base of the deep flat-floored *sulcus extensorius* as in other *Coenocorypha* species, but unlike *Gallinago* where the medial one is raised above the floor on the medial bounding ridge of the sulcus. The fossil distal right tarsometatarsus has broken trochleae, but the plantar surface of the base of *trochlea metatarsi IV* (TIV) is nearly on the same plane as that of TIII, as in other *Coenocorypha*, but unlike *Gallinago*, where the planes of these trochlear surfaces meet at a distinct angle. The *foramen vasculare distale* is large and opens distally on to a flat plantar surface between TIV and TIII. The distance between TII and TIV is wider than the basal width of TIII, unlike the compressed state in *Gallinago* where it is narrower.

### Skull elements

Two fragments of the mid- to posterior end of the rostrum complete the paratype series (Fig. 2). This compound bone is formed from the distally-expanded fused *os nasales* overlain by the nasal bar of the premaxilla as shown by the juvenile *Coenocorypha aucklandica* MNZ 18340. One fossil fragment preserves the most proximal section including the length of the impressions for the nasal choanae, which are *c.* 12 mm long and have a convex dorsal margin. The other fragment preserves the distal half of the impressions for the nasal choanae and the entire length of the swollen mid-section comprised of the inflated distal ends of the fused nasals and the overlying premaxilla. The inflated section is *c.* 21 mm long, 2.8 mm wide and 3.4 mm deep at maximum. It has ventro-lateral ridges that converge in a steep angle to a point, distal of the impressions for the nasal choanae, as in all *Coenocorypha* sp. If the proportions are the same as in *Coenocorypha huegeli* MNZ 25692, then



Figure 2. The skull of *C. huegeli* MNZ 25692 compared to rostral fragments MNZ S38711 referred to *Coenocorypha miratropica*, showing the impressions for the nasal choanae.

the combined length of the impressions for the nasal choanae to the end of the inflated section is 46% of total length, which would give a predicted total length of the premaxilla of 71 mm for the Fijian snipe.

Among charadriiforms, only *Coenocorypha*, *Scolopax*, *Limosa*, and *Limnodromus* have an elongate rostrum that has marked ventral swelling distally of the impressions for the nasal choanae. *Scolopax* has a similar expansion of the distal parts of the *os nasales* and the impressions for the nasal choanae are similarly convex on their dorsal margin to *Coenocorypha*. However, it differs in that the ventrolateral ridges bounding the swollen *os nasales* converge towards the cranium at a much narrower angle to meet as a sharp crest (*septum nasale*), at a point midway along the impressions for the nasal choanae. *Limnodromus* differs markedly as the dorsal margins of the impressions for the nasal choanae are concave (convex in *Coenocorypha*) and slope down anteriorly, and the swollen *os nasales* lack ventrolateral ridges that converge cranially. In *Limosa*, on the ventral surface of the swollen *os nasales*, lateral ridges bound a deep central groove, whereas in *Coenocorypha*, the ventral surface carries a prominent medial ridge. *Gallinago*, which is generally considered closely related to *Coenocorypha*, lacks markedly inflated distal *os nasales* in the rostrum, although this region has a central keel as in *Coenocorypha*. In *Gallinago*, the length of the dorsal surface of the premaxilla over the distal end of the impressions for the nasal choanae is concave. Also, in *Gallinago*, the impressions for the nasal choanae are separated by a deep ossified *septum nasale* whose ventral margin is continuous with, and on the same horizontal plane as, the ventral ridge in the mid-section of the rostrum. In contrast, in *Coenocorypha*, the *septum nasale* is poorly developed and does not extend as far ventrally as the swollen base of the *os nasales* immediately distal of it.

## Discussion

There are only two sedentary genera of scolopacids in the Pacific region: *Coenocorypha*, with a radiation centred on the New Zealand region and *Prosobonia*, from the central eastern Pacific. The Tuamotu Sandpiper *P. cancellata* and the historically extinct *P. leucoptera* of the Society Islands are shown to have a closer relationship to the Tringini than other scolopacids (Zusi & Jehl 1970), and with a very short bill and long slender tarsometatarsi are very different to *Coenocorypha*.

The species of snipe in the New Zealand region have often been listed in just two species (Auckland Island Snipe *Coenocorypha aucklandica*, Chatham Island Snipe *C. pusilla*) in addition to the extinct Forbes Snipe *C. chathamica* Forbes, 1893, also from the Chatham Islands, e.g. Turbott (1990). However, recent reassessments of the taxonomic status of the several insular populations by first Higgins & Davies (1996), and then Holdaway *et al.* (2001), and Worthy *et al.* (2002), show that most insular forms recognised by Turbott (1990) as subspecies, warrant specific status. Most recently, Worthy *et al.* (2002) have reassessed the taxonomic status of the fossil forms known from the North and South islands of New Zealand, concluding that they are distinct from each other and referable to *Coenocorypha barrierensis*

and *C. iredalei* respectively. Therefore, in addition to these two species, New Zealand has *C. huegeli* from the Snares Island, *C. aucklandica* from both the Auckland Islands and Antipodes Island (with subspecific distinction), *C. pusilla*, extant in the Chatham group, and *C. chathamensis*, extinct from the Chatham group. A recently discovered population from an islet off Campbell Island is undescribed but similar to *C. aucklandica* (Colin Miskelly, pers. comm.).

The extinct *C. chathamica* was described on the basis of skulls and there is no description of its post-cranial elements. Its humeri are, however, no bigger than those of *C. aucklandica* (Table 2), and their size range may overlap that of *C. pusilla* (A. Tennyson, pers. comm.), so pending a morphological study of Chatham Island fossil snipe bones, reliable data in the form of summary statistics are not yet available (Worthy *et al.* 2002).

Outside of the New Zealand region a *Coenocorypha* species has been reported from Norfolk Island (Meredith 1985, 1991). Norfolk Island lies on the same continental fragment as New Zealand and has more avifaunal similarities with New Zealand than to Australia (Holdaway *et al.* 2001). The figured specimens (Meredith 1991: Plate 2B) are of similar size to *C. aucklandica* from the Auckland Islands, and were referred to that taxon by Meredith (1991). However, as most New Zealand snipe taxa have similar sized humeri and tibiotarsi, yet differ in other ways such as element proportions, plumage, and behaviour, this specific attribution may not be correct.

Balouet & Olson (1989) reported a *Coenocorypha* sp. from New Caledonia on the basis of partial right and left humeri and a partial coracoid and commented that they represented a species much larger than the New Zealand species.

The Fijian *Coenocorypha* has not been compared to the New Caledonian material but, apart from size, the fragmented nature of the humeri from New Caledonia and the lack of a coracoid from Fiji forbid comparison. The Fijian bird is clearly markedly larger than all the New Zealand species and larger than the Norfolk Island bird. All previous records of *Coenocorypha* occur on islands associated with the continental fragment on which New Zealand lies. The presence of this essentially New Zealand genus in Fiji on Vitilevu adds a new, southern, biogeographic element to that fauna. Its extant birds are mostly related to birds farther east in Tonga and Samoa (Watling 1982) and some of the extinct birds and the herpetofauna have relationships to the west and particularly to the Solomons (Worthy 2000, 2001a, b, Worthy *et al.* 1999).

The description of *Coenocorypha miratropica* raises the total of described extinct birds to seven, with two additional recognised, but undescribed, species from Vitilevu. A minimum of 56 land bird species were therefore formerly indigenous to Vitilevu (78 for the Fijian archipelago). Thus at least 20% of the Vitilevu avifauna, including at least six genera and all the more aberrant forms, are now known to have become extinct in the late Holocene.

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## **Reassignment of *Chordeiles vielliardi* Lencioni-Neto, 1994, to *Nyctiprogne Bonaparte*, 1857, with comments on the latter genus and some presumably related chordeilines (Caprimulgidae)**

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*Chordeiles vielliardi* was described from two specimens: an adult male and a juvenile male taken near Manga, Bahia (10°23'S, 42°30'W), in the valley of the Rio São Francisco, north-eastern Brazil (Lencioni-Neto 1994). Lencioni-Neto diagnosed it as a 'Caprimulgidae of small size, without white markings on the wing, tail, or throat.' He allocated it to the genus *Chordeiles* and concluded that 'the most closely related species is the sympatric *Chordeiles pusillus*' because of its 'relatively small bill and lack of prominent rectal bristles... proportions near those of *Chordeiles pusillus*... and approaching that species in its pattern, habitat, and behaviour' (translation from description in French). The new species was not tape-recorded and the only vocalization heard, a 'bit-bit' delivered during the day when the birds were flushed from day-roosts, was described as similar to a vocalization of Least Nighthawk *Chordeiles pusillus*.

During the course of field work in November 1994, in the valley of the Rio São Francisco near Januária in northern Minas Gerais (15°31'S, 44°23'W) c. 600 km south of Manga, Bahia, the first four authors heard and observed several small nightjars similar to Band-tailed Nighthawk *Nyctiprogne leucopyga*, a species unknown from Minas Gerais or from the valley of the Rio São Francisco. We captured, photographed, measured, then released one individual, and tape-recorded others. These birds lacked